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SENTRY OPTRONICS CORP.

HDS Infrared Thermometer Instruction Manual

Infrared Thermometer ST-670

HDS INFRARED THERMOMETER

CE RoHS COMPLIANT

HDS Infrared Thermometer

Instruction Manual

Version-01 07/MAY.

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1. Product Introduction

Thank you for purchasing this infrared thermometer. The Infrared Thermometer is a non-contact infrared temperature measuring instrument. To measure a temperature , point the unit at the object until the temperature is read , pull the measuring trigger and hold. Make sure the target area is larger than the unit's spot size. For large target objects assure you are within target distance.

1-1 Features

Features with board temperature and high DS ratio. These allow user to monitor the target temperature for a long distance, far away from the potential risk.

- High DS ratio.
- Adjustable emissivity from 0.1 to 1.00 in 0.01 steps.
- Ultra low power consumption in shutdown mode.
- Extended long time measuring reliability.
- Laser sighting On/Off is switchable.
- Backlit LCD display.
- °C or °F selectable.
- Electronic trigger lock.

1-2 Applications

- Electrical troubleshooting.
- Automotive repair and maintenance.
- Air conditioner.
- Science experiment.
- Manufacturing processes of semiconductor technology.
- Test terminals on circuits.
- Food safety and processing.
- Perform HVAC energy audits.

2. Safety Information ⚠

Read the following safety information carefully before attempting to operate or service the meter. Only qualified personnel should perform repairs or servicing not covered in this manual.

Laser Warning Note!

Do not point laser directly at eye.
Use caution a round reflective surfaces.
Keep out of reach of children.

2-1 Cautions!

- DO NOT submerge the unit in water.
- This product is not designed for use in medical evaluations. The product can only be used to measure body temperature simply for reference.
  They are meant for industrial and scientific purposes.

2-2 Safety symbols

Dangerous, refer to this manual before using the meter.

CE Certification.

This instrument conforms to the following standards:

En61326: Electrical equipment for measurement, control and laboratory use.

IEC61000-4-2: Electrostatic discharge immunity test.

IEC61000-4-3: Radiated ,radio-frequency, electromagnetic field immunity test.

IEC61000-4-8: Power frequency magnetic field immunity test.

IEC60825-1: Safety.

Tests were conducted using a frequency range of 80-1000 MHZ with the instrument in three orientations.The average error for the three orientations is ±0.5°C (±1.0 °F) at 3V/m throughout the spectrum. However, between 781-1000MHz at 3V/m, the instrument may not meet its stated accuracy.

RoHS Restrict to use of six substances within electrical and electronic equipment (EEE), thereby contributing to the protection of human health and the environment.

The device may not be disposed of with the trash.It promotes the re-use recycling and other forms of recovery of used materials and components, and to improve the environmental performance of all operators (manufacturers , traders , treatment facilities) involved in the life cycle of products. Dispose of the product appropriately in accordance with the regulations in force in your country.

3. Specifications

Temperature Range	-32~760℃ (-25.6~1400ºF)
Accuracy	±3.0ºC(±5ºF) from -32~-20ºC(-25.6~-4Fº) ±2.0ºC(±3ºF) from -20~100ºC(-4~212 ºF), ±2% from 100~760ºC(212~1400ºF)
Thermopile	8~14μm
Repeatability	±1ºC (± 2ºF)
Resolution	0.1ºC(0.1ºF)
Response Time	500 ms
Emissivity	Adjustable 0.1 ~ 1.0
Distance/Spot Ratio	30:1
Supply Voltage	9V
Auto Power Off	Automatically after approx 6s
Operating Temp.	0~50℃(32~122ºF),10~90%RH
°C/ °F Switchable	YES
Backlight	YES
Laser Sight Switchable	YES
Max/Min/Avg.	YES
10 Point Memory	YES
Audio Alarm	YES
Auto Measuring	YES
Dual Display	YES
Tripod Mount	YES
Dimensions	200x166x51 mm
Weight	280g Approx.

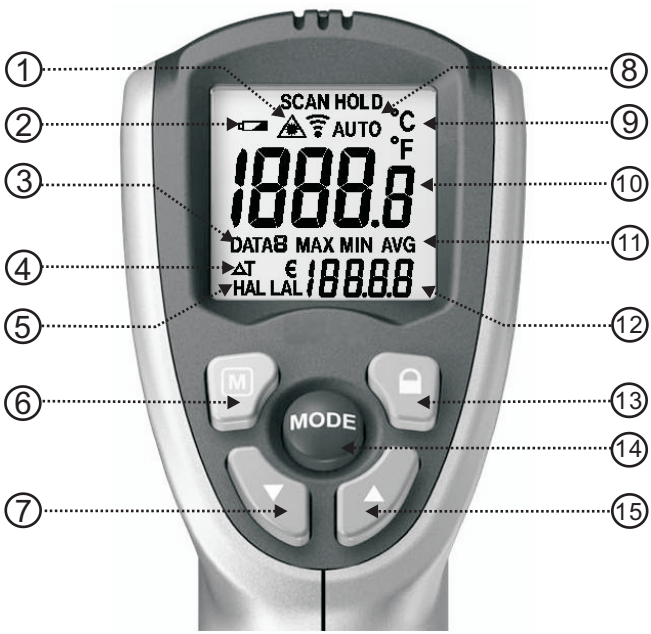
4. Operations of Instrument

4.1 Quick Start

To measure a temperature , point the unit at the target, pull the trigger and hold. Be sure to consider the target area inside the angle of vision of this instrument. The single spot of laser is used for aiming only.

4-2 Unit diagram

LCD & Control panel



① Laser / Buzzer On / Off

② Battery Low

③ Data Log

④ ΔT / Emissivity

⑤ High / Low Alarm

⑥ Memory Key

⑦ Down Button

⑧ SCAN / HOLD / AUTO

⑨ °C / °F Indication

⑩ Main Temperature Display

⑪ Max / Min / Avg

⑫ Set / Record Value

⑬ Lock Key

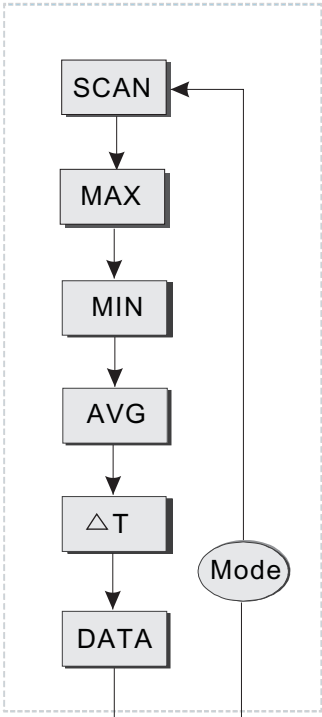
⑭ Mode Key

⑮ Up Button

4.3 Operation Functions

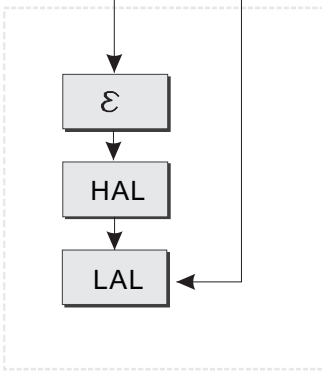
To operate more advance functions, it is simply by using MODE button to change. The sequential operations and the corresponding explanations are shown in the following flow-chart.

Operation Mode



- ●Scan and display the temperature during measurement.
- ●The maximum temperature within one shot measuring..
- ●The minimum temperature within one shot measuring.
- ●The average temperature within one shot measuring.
- ●The highest and lowest temperature difference within one shot measuring
- ●Recall the stored data by using ▲ or ▼ button.

Parameter Setup mode



- ● Emissivity for more accuracy on different materials.
- ●Highest alarm temperature setting.
- ●Lowest alarm temperature setting.

(* The parameters are adjusted by using ▲ or ▼ buttons.)

Remarks

a. **Memory**: Activate the record function by push the M button. To delete all the records, press up or down button to DATA0 and press “M” button.

b. **LOCK**: Push the button to continuously measure and display the temperature without pull the measuring trigger.

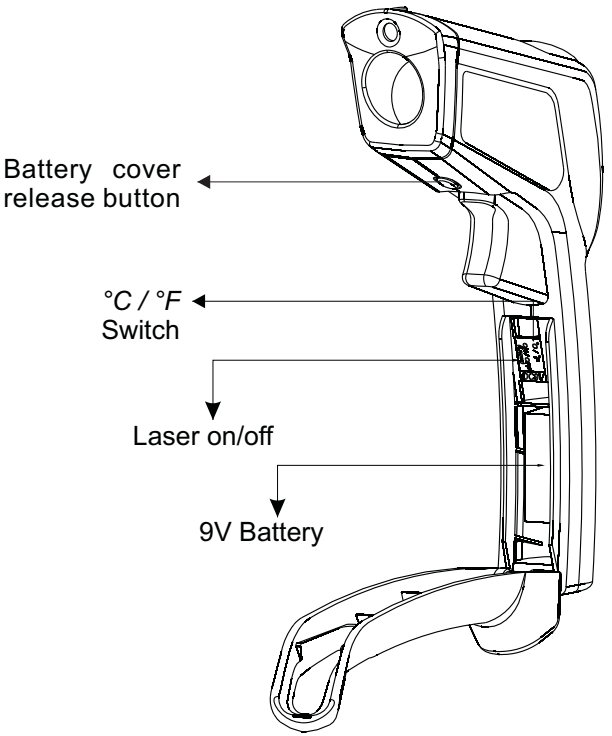
c. The above functions can be activated always in any step of operations mode in flow-chart.

d. In SCAN mode, the LCD displays both the current temperature in Celsius or Fahrenheit. The unit will HOLD the last reading for 30 seconds after the trigger is released. When the battery is low, the battery icon is display, but the unit will continue to function.

e. While DATA# flashes on the left bottom, the value on the main Temperature Display can be recorded in “#” log. Simply press “M” button.

4.4 °C/°F, Laser Switch and Battery Change

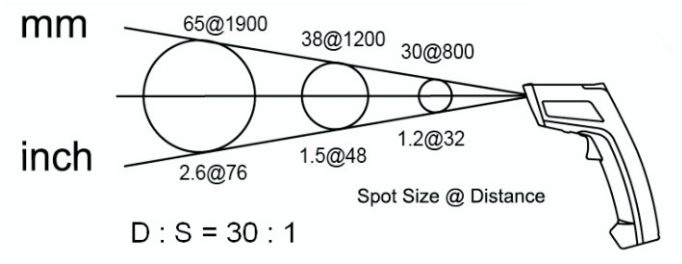
The unit is powered by 9V battery and displays temperatures in either °C or °F. The user has to replace the battery when the battery voltage drops below the voltage for reliable operation and at the same time the low battery symbol will appear. To change the 9V battery, pull open the unit's handle under the trigger. After replacing the battery push back and snap in place.



5. Techniques of Infrared Thermometer

5.1 Field of View (FOV) ratio = Distance to Diameter (DS) ratio

The field of view is the angle of vision at which the instrument operates , and is determined by the optics of the unit. The FOV is the ratio of the distance from the target to the target diameter. The smaller the target , the closer you should be to it . When the target diameter is small, it is important to bring the thermome ter closer to the target to insure that only the target is measured, excluding the surroundings.



5.2 Emissivity

Emissivity is the ability of an object to emit or absorb energy. Perfect emitters have an emissivity of 1 , emitting 100% of incident energy. An object with an emissivity of 0.8 will absorb 80% and reflect 20% of the incident energy. Emissivity is defined as the ratio of the energy radiated by an object at given temperature to the energy emitted by a perfect radiator at the same temperature. All values of emissivity fall between 0.0 and 1.0.

Non-contact temperature sensors measure IR energy emitted by the target, have fast response, and are commonly use to measure moving and intermittent targets, targets in a vacuum, and targets that inaccessible due to hostile environments, geometry limitations, or safety hazard. The cost is relatively high, although in some cases is comparable to contact devices.

6. Maintenance

Cleaning the lens: Blow off loose particles using clean compressed air. Gently brush remaining debris away with a camel's hair brush. Carefully wipe the surface with a moist cotton swab. The swab may be moistened with water.

NOTE:

DO NOT use solvents to clean the lens.

Cleaning the housing:

Use soap and water on a damp sponge or soft cloth.

Emissivity Table

Material	Temp °C/°F	Emissivity
Gold(pure highly polished)	227/440	0.02
Aluminum foil	27/81	0.04
Aluminum disc	27/81	0.18
Aluminum household(flat)	23/73	0.01
Aluminum (polisned prate 98.3%)	227/400	0.04
	577/1070	0.06
Aluminum(rough plate)	26/78	0.06
Aluminum(oxidized @599°C)	199/390	0.11
	599/1110	0.19
Aluminum surfaced roofing	38/100	0.22
Tin(bright tinned iron sheet)	25/77	0.04
Nickel wire	187/368	0.1
Lead(pure 99.95-unoxidized)	127/260	0.06
Copper	199/390	0.18
	599/1110	0.19
Steel	199/390	0.52
	599/1110	0.57
Zinc galvanized sheet iron(bright)	28/82	0.23
Brass(highly polished):	247/476	0.03
Brass(hard rolled-polished w/lines):	21/70	0.04
Iron galvanized(bright)	-	0.13
Iron plate(completely)	20/68	0.69
Rolled sheet steel	21/71	0.66
Oxidized iron	100/212	0.74
Wrought iron	21/70	0.94
Molten iron	1299-1399/3270-2550	0.29
Copper(polished)	21-117/70-242	0.02
Copper(scraped shiny not mirrored)	22/72	0.07
Copper(Plate heavily oxidized)	25/77	0.78
Enamel(white fused on iron)	19/66	0.9
Formica	27/81	0.94
Frozen soil	-	0.93
Brick(red-rough)	21/70	0.93
Brick(silica-unglazed rough)	1000/1832	0.8
Carbon(T-carbon 0.9% ash)	127/260	0.81
Concrete	-	0.94
Glass(smooth)	22/72	0.94
Granite(polished)	21/70	0.85
Ice	0/32	0.97
Marble(light gray polished)	22/72	0.93
Asbestos board	23/74	0.96
Asbestos paper	38/100	0.93
	371/700	0.95
Asphalt(paving)	4/39	0.97

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